Procedural pain management in neonates, infants and children

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SUMMARY POINTS

- Neonates, infants and children all feel pain and require analgesia for painful procedures.
- Many painful procedures are associated with medical interventions, including immunisation, heel lance, venesection, IV cannulation and dressing change.
- Untreated pain can have short and long term effects, including sensitisation to pain episodes in later life.
- A range of non-pharmacological and pharmacological interventions have been shown to be effective for procedural pain management in infants and children, and are most effective when used in combination.
- Developmental changes in pain responses, analgesic response and drug pharmacokinetics need to be taken into account when planning procedural pain management for neonates.
- Comprehensive evidence based guidelines are available to guide effective procedural pain management in neonates, infants and older children.

For neonates, infants and children, medical attendance or admission to hospital often requires examination, investigations, treatment or procedures that are associated with pain.

Pain associated with such investigations, treatment or procedures is defined as Procedural Pain. It includes that caused by intravenous cannulation, venepuncture, and heel lance in infants, and in older children includes finger prick for blood tests, immunisations, laceration suture, dressing changes - particularly for children with burns, lumbar puncture, and bone marrow procedures - particularly for children with cancer.

Procedural pain may be for an isolated intervention, but not uncommonly a period of treatment or investigation requires a repeated number of such episodes. Studies have continued to highlight that in hospitalised children inadequate pain management is a frequent occurrence (1,2,3) demonstrating an on-going lack of translation of UK, international and IASP paediatric pain guidelines (4-9), including procedural pain management guidelines, into the clinical environment.

Evidence suggests that neuroplasticity, particularly in infancy when neuronal pathways are still maturing, means that recurrent and poorly treated painful episodes can lead to both short and longer term hyper-sensitivity to painful stimuli, which persists into later life (10-13). This further re-enforces the importance of good procedural pain control at the time, irrespective of age, and possibly with particular importance with reducing age (14).

Maturational change from birth through to adolescence affects not only pain perception, processing and responses, but also analgesic drug pharmacokinetics (absorption, distribution, metabolism and elimination) and pharmacodynamics (drug efficacy, sensitivity to side effects). Taking account of these developmental changes is key to the safe and effective use of analgesic agents across this age range. Developmental changes are most marked in the neonatal period, where rapid maturation of renal and hepatic function within the first year of life mean that analgesic dosing and clearance, though often reduced in neonates, in childhood become equal to or greater than that in adults. Neonates are also more sensitive to the adverse effects of a number of analgesic agents, and therefore careful choice of technique accompanied by appropriate close monitoring are required.

Where investigation or treatment is on-going, repeated painful episodes can trigger significant anxiety and behavioural changes both

at the time and with escalation on subsequent re-exposure if the child's anxiety and pain are not managed effectively. This can lead to longer term emotional and psychological implications for both the child and the family, in addition to potentially having a detrimental effect on clinical course.

Effective management of procedural pain therefore ideally requires a multimodal approach, combining non-pharmacological with pharmacological techniques to maximise analgesic efficacy and procedure tolerance, while minimising adverse side effects and psychological sequelae.

An assessment of the anticipated pain intensity and duration is required, together with consideration of any post procedure pain or discomfort that may require analgesia past the time of the procedural intervention itself. Additionally, it is important to assess the child, infant or neonate regarding:

- underlying medical conditions and general clinical status
- chronological and developmental age
- previous pain experience
- pain associated anxiety
- temperament
- comprehension of the planned procedure
- knowledge of both the child's or parental pre-existing anxieties
- anxiety relating to the planned procedure.

Age appropriate monitoring of pain and distress during the procedure is important, to assess the efficacy of interventions and to allow adjustment or up-scaling of input if the pain management strategy proves to be insufficient, and the procedure becomes too painful or distressing to accomplish. The techniques with the best evidence base for effectiveness in the age group and for the procedure planned should be employed.

General principles underpinning procedural pain management are summarised in Table 1.

Strategies for the management of procedural pain

As with management of acute pain, a pre-emptive multimodal approach increases analgesic efficacy and procedural tolerance. In infants and children this ideally includes the use of a combination of both pharmacological and non-pharmacological techniques wherever possible.

Within the armamentarium for **non-pharmacological** techniques, children are particularly amenable to play therapy, music, distraction and guided imagery techniques. There is also good evidence for the efficacy of hypnosis and cognitive-behavioural approaches. Each of these techniques aims to reduce perception, enhance coping skills during the event, or divert the focus of attention away from the procedural event.

Pharmacological techniques for procedural pain can include a range of options such as: the use of topical local anaesthetic creams or gels, infiltration with local anaesthetic agents, use of systemic analgesics administered via a number of routes including oral, sublingual and nasal; or inhalational techniques such as the use of nitrous oxide for dressing changes or chest drain removal.

Neonates are often more sensitive to adverse effects of medication due to the immaturity of many systems including the renal, hepatic and central nervous systems. Increased sensitivity to the sedative and respiratory depressant effects of opioids, means that a considerable adjustment in dose, interval, threshold for administration and level

Table 1 General principles of procedural pain management (*9)

1.Infants and children of all ages, including preterm neonates feel pain and require analgesia for painful procedures.
2.Developmental differences in responses to pain and analgesics need to be considered when choosing analgesia.
3.Consider if the planned procedure is necessary: • Avoid multiple procedures where possible • Consider how the information gained may influence care • Consider whether modification of procedure may reduce pain e.g. venepuncture less painful than heel lance.
4.Consider whether sedation or general anaesthesia may be required for safe and satisfactory outcome.
5.Ensure suitable environment: a quiet, calm location with suitable toys and distractions.
6.Ensure appropriate personnel are available: enlist additional experienced help when necessary.
7.Allow sufficient time for analgesic measures and medications to be effective.
8.Formulate a clear plan of action should the procedure fail or pain become unmanageable using the techniques selected.
GOOD PRACTICE POINT: Pain management for procedural pain should be planned, taking into account general principles and should include both pharmacological and non-pharmacological strategies wherever possible.
*From: Association of Paediatric Anaesthetists of Great Britain and Ireland. Good practice in postoperative and procedural pain London, APA 2008 Available from http://www.apagbi.org.uk/sites/apagbi.org.uk/files/APA%20Guideline%20part%201.pdf

of observation after administration is required in order to monitor for the development of side effects.

Effective management of procedural pain therefore requires management of the anticipated pain and management of both existing and anticipated anxiety. Ideally this uses a combination of pharmacological and non-pharmacological techniques and takes account of:

- developmental pharmacology, to guide safe and effective analgesic dosing
- developmental age, to guide choice of suitable non-pharmacological strategies
- developmental changes in pain responses, to allow effective age appropriate assessment to monitor efficacy of interventions and allow adjustment where required.

On occasions where the pain and distress are anticipated to be significant or previous episodes have provoked significant pain or distress, then the use of sedation with analgesia or recourse to general anaesthesia should be considered. For repeated painful procedures, general anaesthesia may be the preferred option for some children e.g. repeated lumbar puncture and bone marrow procedures during cancer care.

Whatever techniques are employed, these should always be used in conjunction with age appropriate assessment of pain and anxiety to monitor the efficacy of interventions and to allow for an adjustment or change of approach if necessary. Age appropriate monitoring to detect adverse effects should also be carried out.

Management of procedural pain

1 Non-pharmacological interventions

Many non-pharmacological interventions have been put forward for reducing procedural pain. These include guided imagery, relaxation and massage. The major areas of evidence to support such interventions are for hypnosis, music, distraction, and psychological interventions.

1.1 Hypnosis and distraction

A recent meta-analysis of non-pharmacological interventions (2) showed hypnosis and distraction to be the modalities with the best evidence base for efficacy in reducing pain, including procedural pain and distress. Hypnosis would seem to have a place in the preparation for the procedure as well as during its course. A number of factors, such as whether self or therapist administered, and the age, sex and developmental level of the child, contribute to its effectiveness.

1.2 Music

The efficacy of music on pain in children and neonates, including procedural pain, has shown positive results in some individual studies, but, as assessed by a recent review of systematic reviews (2), its effectiveness was inconclusive.

1.3 Psychological interventions

Psychological interventions have a number of strategies, including cognitive behavioural approaches, to reduce anxiety and distress as well as pain. This has been particularly focused on needle related interventions, such as immunisation and venepuncture. Studies have looked at a variety of approaches including nurse coaching and distraction, parent distraction coaching, and distraction with suggestion, with some encouraging results.

A Cochrane review of psychological interventions for needle related procedural pain concluded that psychological interventions were effective. The largest size of effect in reducing pain and distress in children was seen with distraction combined cognitive-behavioural interventions, and hypnosis (15).

2 Non- pharmacological interventions in neonates

Non-pharmacological interventions in neonates differ somewhat from those used in infants and children. Neonates respond well to sensory stimulation such as gentle stroking, rocking and non-nutritive sucking, and to maternal interventions such as being breast-fed during procedures where practicable. In addition a significant analgesic effect is seen with oral sweet solutions such as sucrose (14).

2.1 Sucrose

Sucrose solutions have been shown to reduce the stress response and behavioural responses to pain in neonates, falling uneasily between being defined as pharmacological and non-pharmacological therapy (16, 17).

Sucrose reduces the pain response to intravenous cannulation, venesection, heel lance and eye examinations for retinopathy of prematurity. A number of guidelines recommend its use (4,5,7,8,9,18) and a recent Cochrane review (19) confirmed its efficacy and safety for procedural pain in neonates for individual painful events.

The mechanism of action for sucrose remains elusive, and there are recent suggestions that it may have a primarily behavioural effect on the pain response rather than a directly analgesic effect (17).

Sucrose dosing, administration and adverse effects are outlined in Table 2.

3 Pharmacological interventions

3.1 Topical anaesthesia

Topical local anaesthesia is widely used either on its own or in combination with other techniques. Methods to produce surface anaesthesia include use of vapo-coolant sprays, topical anaesthetics creams, and local anaesthetic lubricant gels.

Vapo-coolant sprays, including ethyl chloride or fluromethane, provide transient numbness by evaporative cooling suitable

Table 2 Sucrose dosing, administration and adverse effects (*9)	
Gestational age:	**Maximum volume sucrose 24% solution per procedure**
27 – 31 weeks	0.5 ml
32 – 36 weeks	1.0 ml
37 weeks and over	2.0 ml
Administration: Small repeated volumes, to maximum volume limit per procedure as above.	
Administration methods: By syringe, one drop at a time to tongue/applied by dip of pacifier (estimate 0.2ml per dip)	
Cautions, adverse effects: Coughing, choking and desaturation with oral administration. Safe for one off administration, but possible adverse neurobiological effects from repeated, frequent administration in preterm infants (20).	
*From: Association of Paediatric Anaesthetists of Great Britain and Ireland. Good practice in postoperative and procedural pain London, APA 2008 Available from: http://www.apagbi.org.uk/sites/apagbi.org.uk/files/APA%20Guideline%20part%201.pdf	

for procedures lasting less than 60 seconds, with good efficacy particularly for venepuncture and immunisations.

In the UK, EMLA and Ametop are the most commonly used **topical local anaesthetic cream** preparations in paediatric practice (Table 3). Topical anaesthesia is achieved by passive diffusion of local anaesthetic through the skin surface to inhibit transmission in sensory neurones in the dermis and epidermis. Effective use requires application with an occlusive dressing and, importantly, sufficient duration of application to ensure a good therapeutic effect. Limitations to the use of EMLA and Ametop include predisposition to methaemoglobinaemia and preterm age (see Table 3).

A number of innovative products aim to reduce onset time by accelerating the transfer of local anaesthetic. These include heat enhanced diffusion, iontophoresis, sonophoresis, laser assisted and pressurised gas delivery systems. None has yet gained widespread uptake into mainstream paediatric practice.

Both topical anaesthetics and cold spray techniques have proven efficacy in reducing the needle insertion pain for intravenous cannulation and venepuncture, with Ametop being superior to EMLA in this regard (2, 9,19).

Lidocaine 1% and 2% lubricant gels are effective for urethral analgesia ahead of urinary catheterisation. They also reduce discomfort during insertion of nasogastric tubes and can be used topically for analgesia following circumcision.

Table 3 Topical anaesthesia: BNFC guidance on properties and use of EMLA and Ametop topical anaesthesia		
	EMLA	**Ametop**
Formulation	Eutectic mix lignocaine 2.5% and prilocaine 2.5%	Tetracaine 4% gel
Time of onset to effective analgesia	60 minutes	30 minutes
Duration can be left applied to skin	5 hours	1 hour
Duration of action after removal	1-2 hours	4-6 hours
Age limits	Under 1 year - not licensed Not recommended < 1 month*	Not recommended in neonates < 1 month, or preterm infants
Dose	**Age**	**Dose**
	0-3 months	1g
	3-12 months	2g
	1-5 years	10g
	6 -11 years	20g
Caution	G6PD deficiency Anaemia Methaemoglobinaemia	Methaemoglobinaemia
Contra –indications	Open wound Mucous membranes Atopic dermatitis	Inflamed, traumatised or vascular areas
*EMLA is usually safe to use in neonates and infants without predisposition to methaemoglobinaemia e.g. G4PD deficiency, haemoglobinopathies BNFC – British National Formulary for Children		

3.2 Paracetamol and nonsteroidal anti-inflammatory drugs (NSAIDs)

Despite their good side effect and safety profile, paracetamol and NSAIDs have insufficient analgesic potency to be useful for procedural analgesia. They may though have a place contributing to post procedural analgesia, as part of a multimodal strategy, where pain and discomfort continues for a period after the procedure has been performed e.g. post chest drain insertion. Information on age-related dosing may be found in the Summary of Product Characteristics available from the Electronic Medicines Compendium (eMC) website www.medicines.org.uk.

3.3 Opioid analgesics

Opioid analgesics have been used over many years for analgesia and sedation in neonates, infants and children. There are many potential routes of administration including: sublingual, nasal, in addition to oral, rectal and intravenous. Routes available, time to onset and analgesic duration of action vary considerably between agents.

Analgesia is mediated via an agonist effect at central opioid receptors, the most potent for analgesia being the mu- receptor. Opioid receptor stimulation also accounts for the profile of adverse opioid effects (see Table 4), the most concerning of these being the potential for respiratory arrest.

The clinical effects of opioids are prolonged in patients with reduced hepatic and renal function. This includes in **neonates** where organ function immaturity is combined with increased sensitivity to the respiratory depressant and sedative effects. Reduced dosage, increased dosing interval and careful titration are required, particularly in the under 3-6 month age group, accompanied by increased intensity of monitoring for signs of respiratory depression.

Opioid requirement shows significant inter-individual variability, so the effects following administration need to be assessed, and the dose titrated to get optimum results. Due to differences in onset time of analgesic effect it is important to allow sufficient time following opioid administration before commencing the planned procedure.

Dosing guidance for opioids is outlined in Table 5. If dosing guidelines are followed, opioids can be used safely as long as suitable pre-administration assessment, post administration monitoring, age appropriate pain assessment and suitably trained staff are available, and monitoring and supervision continue until the sedative and respiratory depressant effects have resolved. Particular caution is required if opioids are co-administered with other agents which have sedative effects.

Table 4	Opioid side effects
Opioids	Respiratory depression Sedation Miosis Nausea and vomiting Pruritus Dysphoria/excitation/hallucinations Reduced gastrointestinal motility: constipation, ileus Urinary retention Tolerance – i.e. loss of analgesic efficacy requiring increasing dose with time to maintain effect
Morphine	Histamine release, vasodilatation, hypotension and pruritis

3.4 Morphine

Morphine is the most commonly used opioid for the management of procedural pain. It can be given by a variety of routes (see Table 5), with good absorption via all but the transdermal route. After oral administration peak levels are seen around one hour post dose, with maximum analgesic effects occurring 30 minutes after peak levels. A suitable interval therefore needs to elapse after oral dosing before a planned painful procedure is commenced. Administration via the IV route gives more rapid onset of effect, within 5-10 minutes, allowing more readily for incremental dose titration if required. Morphine undergoes hepatic metabolism, with formation of an active metabolite morphine-3-glucuronide, which undergoes renal excretion.

The toxicity and adverse effects of morphine are summarised in Table 4. Particular caution and dose reductions are required when morphine is administered to patients with renal or hepatic impairment, or to infants of less than 3-6 months of age. Infants demonstrate increased sensitivity to opioid related side effects, particularly the sedative and respiratory depressant effects. Morphine will show additive sedative effects when it is used in conjunction with other sedative agents.

3.5 Diamorphine

Diamorphine is a water soluble opioid with twice the potency of morphine, though it has a similar onset time and duration of action. Its greater solubility allows for dosing to be effective in small volumes administered intranasally. This route is used successfully in many emergency departments for the management of children with fractures.

3.6 Tramadol

Tramadol is a relatively weak opioid agonist. Its analgesic action includes enhancement of noradrenergic and seratonergic pathways in addition to opioid activity, influencing pain processing at the level of the spinal cord. Tramadol is metabolised in the liver to a highly potent active metabolite, with the extent of conversion being subject to genetic polymorphism. Genetic polymorphism therefore influences tramadol's analgesic effect.

3.7 Fentanyl

Fentanyl is a highly potent synthetic opioid, with more rapid onset and offset of action than morphine. It may therefore be preferred for short duration procedures, where post-procedural pain is minimal. Fentanyl's lipophilicity means that it can be readily absorbed via transdermal, buccal and nasal routes, as well as being rapidly effective following intravenous administration.

Fentanyl lozenges can be effective in children requiring repeated procedures such as dressing changes. Fentanyl transdermal patches,

Table 5 Opioids: dosing for procedural pain and routes of administration				
Route	**Oral dose**	**Oral dosing interval**	**IV increment dose (max dose)**	**Other routes**
Tramadol				
• Child	1-2 mg/kg	6 hourly	1mg/kg (100mg)	PR, dose as for IV
Morphine			SC, dose as for IV PR, dose as for oral	
• Neonate	80 mcg/kg	4-6 hourly	25 mcg/kg (50mcg) (careful incremental titration in neonates)	
• Infant 1 – 3 months	80-100 mcg/kg	4 hourly	25 mcg/kg (100mcg)	
• Infant 3 –12 months	100-200 mcg/kg	4 hourly	50 mcg/kg (200mcg)	
• Child	200-400 mcg/kg	4 hourly	50 mcg/kg (200mcg)	
Diamorphine				SC, dose as for IV
• Neonate			10-25 mcg/kg	
• Child (>1year)	100-200 mcg/kg	4 hourly	25-100 mcg/kg	Intranasal: 100 mcg/kg (max 10mg) (max 10mg) in 0.2ml sterile water, instil into one nostril
Fentanyl	NA		0.5-1.0 mcg/kg	
• Child 2-18 years (weight 10kg+)				Transmucosal: Lozenge 15-20 mcg/kg, (max 400 mcg)
IV - intravenous, Max - maximum, NA - not applicable, PR – rectal, IM – intramuscular, SC - subcutaneous				

though effective in children with ongoing opioid requirements, are not suited to use in procedural pain management as peak levels occur many hours after the patch has been applied.

3.8 Ketamine

Ketamine has a long history of safe use in children for analgesia and sedation for painful procedures, particularly in burns units for dressing change and in A+E for short procedures. It can be administered via a number of routes including oral, intravenous and intramuscular. The dosing and adverse effects of ketamine are outlined in Table 6.

Ketamine is an N-methyl D-aspartate (NMDA) receptor antagonist, producing analgesia at low dose and dissociative anaesthesia at higher doses. Analgesia is characterised by significantly less respiratory depression than that seen with opioids, although increased salivation and airway obstruction may still occur.

Hepatic metabolism results in the formation of an active metabolite, norketamine, that makes a significant contribution to analgesia. After oral administration, peak ketamine and norketamine levels are seen at around 60 minutes, so a delay of 45-50 minutes between oral administration and a planned painful procedure is recommended. Oral pharmacokinetics in children have been recently reviewed (21). Although the literature includes individual oral and intramuscular dosing regimes, there is no recommended dosing guidance for procedural pain from recent published guidelines (9), or from the British National Formulary for Children (BNFC).

Table 6 Ketamine dosing and adverse effects	
Route	IV
Dose	2mg/kg
Duration	Surgical anaesthesia 5-10 mins
Other Routes	IM, oral
Cautions	Raised intracranial pressure, predisposition to nightmares/hallucinations*
Contraindications	Hypertension, severe cardiac disease, raised intracranial pressure, head trauma, acute porphyria
Side effects	Tachycardia, hypertension, increased salivation, laryngospasm, anxiety, diplopia, nystagmus, raised intra-ocular pressure, nightmares/hallucinations - incidence reduced by benzodiazepines*
IV – intravenous, IM – intramuscular, mins - minutes	
*BNFC 2011 S(+) Ketamine isomer, with twice the potency of the racemic mixture, confers a significantly lower hallucinogenic risk	

As doses of ketamine used to achieve analgesia can readily transition to deep sedation or anaesthesia, its safe use requires specialist supervision with immediate availability of personnel with advanced airway skills.

3.9 Nitrous oxide

Nitrous oxide is an inhaled anaesthetic gas, with low anaesthetic potency but analgesic effects mediated by NMDA receptor antagonism. It has the advantage of rapid analgesic onset and offset and, if no other sedative agents are used, fasting is not required.

Nitrous oxide commonly comes as Entonox, which comprises a compressed gas mixture of 50% nitrous oxide and 50% oxygen in a portable metal cylinder, with a mouthpiece and demand valve allowing the child to self-administer. Self-administration requires active cooperation on the part of the child and is generally suited to children aged five years and over. The safe administration of Entonox requires a trained assistant to be present, with regular observations and monitoring during use. Additive effects can be seen if Entonox is co-administered with other sedative agents.

Evidence of analgesic efficacy has been shown when Entonox is used in conjunction with local anaesthetic for intravenous cannulation and minor laceration repair, as well as to provide sedation and analgesia for burn dressing changes.

The contra-indications, cautions, advantages and disadvantages of nitrous oxide are outlined in Table 7.

Table 7 Nitrous oxide: advantages, disadvantages, contra-indications and cautions

Nitrous oxide delivered as Entonox = 50% Nitrous oxide, 50% oxygen	
Advantages	Analgesic and sedative actions Rapid onset analgesia within 3-5 breaths Rapid offset Inhalational route
Disadvantages	Experienced personnel required Cooperation of the child needed Not suitable for young children: age > 5yrs Room should have adequate scavenging Entonox delivery system required
Contra-indications	Pneumothorax Bowel obstruction Head injury Raised intracranial pressure Chronic respiratory disease
Cautions	
• Prolonged exposure or frequent use	Interference with vitamin B12 metabolism, megaloblastic anaemia and bone marrow suppression
• Use	Not more often than every four days, with haematological monitoring
• Caution	With poor or vegetarian diet or history of anaemia - check B12 levels prior to administration

Procedure based guidance

Comprehensive evidence based recommendations from the Association of Paediatric Anaesthetists of Great Britain and Ireland's (APA) Good practice in postoperative and procedural pain management guideline(9) with regard to procedural pain management for neonates, infants and older children are summarised in Tables 8 and 9.

Putting it all together

Many painful procedures are undertaken in neonates, infants and children during medical investigation and treatment. Optimising procedural pain relief across this age range requires utilisation of a variety of techniques. Input may be required from a potentially wide multidisciplinary team including physicians, anaesthetists, ward nurses, pain team members, pharmacists, play therapists, psychologists, GPs, and practice and community nurses. Age appropriate pain assessment and monitoring may also be needed around the event.

A number of excellent standards and guidelines for procedural pain in neonates and children are available to guide best practice, but strategies can only be effective if acted upon and utilised. It is key that all those involved in caring for children undergoing painful procedures are aware of the importance of procedural pain management, and ensure that effective interventions are implemented regularly into routine practice.

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Table 8 APA guidance for effective pharmacological and non-pharmacological techniques for pain management in neonates *(9)

General guidance for neonates: (Grade of recommendation for the intervention)**
Allow breastfeeding during procedures where possible (A)
Non-nutritive sucking +/- sucrose for brief procedures (A)

Procedure	**Recommended intervention in neonates** (Grade of Recommendation **)
Blood sampling	Oral sucrose (A) Venepuncture in preference to heel lance (A) Topical LA effective for venepuncture (A) Sensory stimulation in combination with sucrose where possible (B) Topical LA alone insufficient for heel lance (A) Morphine alone insufficient for heel lance (B)
Lumbar Puncture	Topical LA (A)
Urine sampling	LA gel + catheterisation less painful than suprapubic aspiration with topical LA (B)
Ocular examination	LA eye drops (B) Pacifier (B) Sucrose (B)

GOOD PRACTICE POINT: Include pharmacological and non-pharmacological when possible
IV – intravenous, LA - local anaesthetic
* Association of Paediatric Anaesthetists of Great Britain and Ireland. Good practice in postoperative and procedural pain London, APA 2008 Available from: http://www.apagbi.org.uk/sites/apagbi.org.uk/files/APA%20Guideline%20part%201.pdf

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Table 9 APA guidance for effective pharmacological and non-pharmacological techniques for pain management in older children*(9)

Procedure	Recommended Intervention for older Children (Grade of Recommendation**)
Blood sampling	Topical LA for IV cannulation (A) Psychological strategies: distraction, hypnosis (A) Entonox for IV cannulation (B)
Lumbar puncture	Behavioural techniques (A) Topical LA and LA infiltration (B) Entonox (C)
Chest drain insertion or removal	Combine two or more strategies with known efficacy e.g. opioids + Entonox LA infiltration ahead of placement
Urinary catheterisation	Topical LA gel (A) Psychological preparation prior to procedure (B)
Nasogastric tube insertion	Topical LA gel, or 4-10% nebulised lignocaine prior to placement
Immunisations	Psychological strategies, including distraction (A) Procedure modifications to reduce pain: vaccine formulation, needle size, injection depth, Vapo coolant spray (A) Topical LA (B)
Laceration repair	
• Small low tension	Tissue adhesives, reduced pain, similar cosmesis (A)
• Sutures needed	Topical LA, less painful then LA infiltration (A) Injected LA, less painful if solution buffered (A)
•Scalp laceration	Hair apposition technique (HAT), reduced pain (B) Topical LA prior to injected LA (B) Add non-pharmacological in addition: distraction, relaxation, massage (B)
GOOD PRACTICE POINTS: • Psychological preparation of the child and parents prior to the procedure may be helpful • Combine pharmacological with non-pharmacological interventions where possible • Consider Entonox in children who can co-operate with administration • Consider sedation/general anaesthesia for invasive, multiple or repeated procedures.	
IV – intravenous, LA - local anaesthetic	
* From: Association of Paediatric Anaesthetists of Great Britain and Ireland. Good practice in postoperative and procedural pain London, APA 2008 http://www.apagbi.org.uk/sites/apagbi.org.uk/files/APA%20Guideline%20part%201.pdf	
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